

## CLAIMS

1. A method of manufacturing an iron-based sintered alloy member having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, and the balance of Fe and inevitable impurities,

the method comprising:

formulating an Fe powder, a graphite powder and a Cu alloy powder, as raw powders;

mixing the powders to form a powder mixture; and

forming the powder mixture into a green compact and sintering the green compact;

wherein the Cu alloy powder has a composition consisting of 1 to 10% by mass of Fe, 0.2 to 1% by mass of oxygen, and the balance of Cu and inevitable impurities.

2. A method of manufacturing an iron-based sintered alloy member having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.0025 to 1.05% by mass of Mn, and the balance of Fe and inevitable impurities,

the method comprising:

formulating an Fe powder, a graphite powder and a Cu alloy powder, as raw powders;

mixing the powders to form a powder mixture;

forming the powder mixture into a green compact and sintering the green compact,

wherein the Cu alloy powder has a composition consisting of at least one

selected from the group consisting of 1 to 10% by mass of Fe, 0.2 to 1% by mass of oxygen, and 0.5 to 15% by mass of Mn, and the balance of Cu and inevitable impurities.

3. A method of manufacturing an iron-based sintered alloy member having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.001 to 0.7% by mass of Zn, and the balance of Fe and inevitable impurities,

the method comprising:

formulating an Fe powder, a graphite powder and a Cu alloy powder, as raw powders;

mixing the powders to form a powder mixture; and

forming the powder mixture into a green compact and sintering the green compact,

wherein the Cu alloy powder has a composition consisting of 1 to 10% by mass of Fe, 0.2 to 1% by mass of oxygen, 0.2 to 10% by mass of Zn, and the balance of Cu and inevitable impurities.

4. A method of manufacturing an iron-based sintered alloy member having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.0025 to 1.05% by mass of Mn, 0.001 to 0.7% by mass of Zn, and the balance of Fe and inevitable impurities,

the method comprising:

formulating an Fe powder, a graphite powder and a Cu alloy powder, as raw powders;

mixing the powders to form a powder mixture;

forming the powder mixture into a green compact and sintering the green compact,

wherein the Cu alloy powder has a composition consisting of 1 to 10% by mass of Fe, 0.2 to 1% by mass of oxygen, 0.2 to 10% by mass of Zn, 0.5 to 15% by mass of Mn, and the balance of Cu and inevitable impurities.

5. A method of manufacturing an iron-based sintered alloy member having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.001 to 0.14% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Fe and inevitable impurities,

the method comprising:

formulating an Fe powder, a graphite powder and a Cu alloy powder, as raw powders;

mixing the powders to form a powder mixture; and

forming the powder mixture into a green compact and sintering the green compact,

wherein the Cu alloy powder has a composition consisting of 1 to 10% by mass of Fe, 0.2 to 1% by mass of oxygen, 0.01 to 2% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Cu and inevitable impurities.

6. A method of manufacturing an iron-based sintered alloy member having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.0025 to 1.05% by mass of Mn, 0.001 to 0.14% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Fe and inevitable impurities,

the method comprising:

formulating an Fe powder, a graphite powder and a Cu alloy powder, as raw powders;

mixing the powders to form a powder mixture; and

forming the powder mixture into a green compact and sintering the green compact,

wherein the Cu alloy powder has a composition consisting of at least one selected from the group consisting of 1 to 10% by mass of Fe, 0.2 to 1% by mass of oxygen and 0.5 to 15% by mass of Mn, 0.01 to 2% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Cu and inevitable impurities.

7. A method of manufacturing an iron-based sintered alloy member having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.001 to 0.7% by mass of Zn, 0.001 to 0.14% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Fe and inevitable impurities,

the method comprising:

formulating an Fe powder, a graphite powder and a Cu alloy powder, as raw powders;

mixing the powders to form a powder mixture; and

forming the powder mixture into a green compact and sintering the green compact,

wherein the Cu alloy powder has a composition consisting of 1 to 10% by mass of Fe, 0.2 to 1% by mass of oxygen, 0.2 to 10% by mass of Zn, 0.01 to 2% by mass in

total of at least one selected from the group consisting of Al and Si, and the balance of Cu and inevitable impurities.

8. A method of manufacturing an iron-based sintered alloy member having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.0025 to 1.05% by mass of Mn, 0.001 to 0.7% by mass of Zn, 0.001 to 0.14% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Fe and inevitable impurities,

the method comprising:

formulating an Fe powder, a graphite powder and a Cu alloy powder, as raw powders;

mixing the powders to form a powder mixture; and

forming the powder mixture into a green compact and sintering the green compact,

wherein the Cu alloy powder has a composition consisting of 1 to 10% by mass of Fe, 0.2 to 1% by mass of oxygen, 0.2 to 10% by mass of Zn, 0.5 to 15% by mass of Mn, 0.01 to 2% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Cu and inevitable impurities.

9. The method of manufacturing the iron-based sintered alloy member according to any one of claims 1 to 8, wherein the Fe powder, the graphite powder and the Cu alloy powder are formulated so that the content of the graphite powder is from 0.1 to 1.2% by mass, the content of the Cu alloy powder is from 1 to 7% by mass, and the balance is composed of the Fe powder.

10. An oil pump rotor made of an iron-based sintered alloy, comprising an iron-based sintered alloy having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, and the balance of Fe and inevitable impurities.
11. An oil pump rotor made of an iron-based sintered alloy, comprising an iron-based sintered alloy having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.0025 to 1.05% by mass of Mn, and the balance of Fe and inevitable impurities.
12. An oil pump rotor made of an iron-based sintered alloy, comprising an iron-based sintered alloy having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.001 to 0.7% by mass of Zn, and the balance of Fe and inevitable impurities.
13. An oil pump rotor made of an iron-based sintered alloy, comprising an iron-based sintered alloy having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.0025 to 1.05% by mass of Mn, 0.001 to 0.7% by mass of Zn, and the balance of Fe and inevitable impurities.
14. An oil pump rotor made of an iron-based sintered alloy, comprising an iron-based sintered alloy having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.001 to 0.14% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Fe and inevitable impurities.

15. An oil pump rotor made of an iron-based sintered alloy, comprising an iron-based sintered alloy having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.0025 to 1.05% by mass of Mn, 0.001 to 0.14% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Fe and inevitable impurities.

16. An oil pump rotor made of an iron-based sintered alloy, comprising an iron-based sintered alloy having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.001 to 0.7% by mass of Zn, 0.001 to 0.14% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Fe and inevitable impurities.

17. An oil pump rotor made of an iron-based sintered alloy, comprising an iron-based sintered alloy having a composition consisting of 0.5 to 7% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, 0.0025 to 1.05% by mass of Mn, 0.001 to 0.7% by mass of Zn, 0.001 to 0.14% by mass in total of at least one selected from the group consisting of Al and Si, and the balance of Fe and inevitable impurities.

18. The oil pump rotor according to any one of claims 10 to 17, wherein the iron-based sintered alloy has such a texture that base material cells containing Fe, as a main component, Cu and O, which are partitioned with an old Fe powder boundary formed by sintering the Fe powder, as raw powders, are aggregated to form a basis material and the base material cells partitioned with the old Fe powder boundary have such a gradient concentration that the concentration of Cu and O in the vicinity of the old Fe powder

boundary is higher than the concentration of Cu and O of the center portion of the base material cell.

19. An iron-based sintered alloy which has a composition consisting of 0.5 to 10% by mass of Cu, 0.1 to 0.98% by mass of C, 0.02 to 0.3% by mass of oxygen, and the balance of Fe and inevitable impurities, and also has a texture composed of an aggregate of base material cells made of an Fe-based alloy containing C, Cu and O, which are partitioned with an old Fe powder boundary formed by sintering an Fe powder, as raw powders,

wherein the base material cells made of the Fe-based alloy containing C, Cu and O, which are partitioned with the old Fe powder boundary, have such a gradient concentration that the concentration of Cu and O in the vicinity of the old Fe powder boundary is higher than the concentration of Cu and O of the center portion of the base material cell.

20. The iron-based sintered alloy according to claim 19, wherein the base material cells made of the Fe-based alloy containing C, Cu and O, which are partitioned with the old Fe powder boundary, have such a gradient concentration that the concentration of Cu and O is maximum in the vicinity of the old Fe powder boundary, while the concentration of Cu and O decreases toward the center portion of the base material cell and reached a minimum value at the center of the base material cell.

21. A method of manufacturing the iron-based sintered alloy member of claim 19 or 20, which comprises formulating an Fe powder, a graphite powder and a Cu alloy powder having a composition consisting of 1 to 10% by mass of Fe, 0.2 to 1% by mass of



oxygen, and the balance of Cu and inevitable impurities, mixing the powders to form a powder mixture, press-forming the powder mixture into a green compact and sintering the green compact in a hydrogen atmosphere containing nitrogen at a temperature of 1090 to 1300°C.